Document made available under the Patent Cooperation Treaty (PCT)

International application number: PCT/US05/008004

International filing date: 10 March 2005 (10.03.2005)

Document type: Certified copy of priority document

Document details: Country/Office: US
Number: 60/551,980
Filing date: 10 March 2004 (10.03.2004)

Date of receipt at the International Bureau: 18 April 2005 (18.04.2005)

Remark: Priority document submitted or transmitted to the International Bureau in compliance with Rule 17.1(a) or (b)

1303464

THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

March 31, 2005

THIS IS TO CERTIFY THAT ANNEXED HERETO IS A TRUE COPY FROM THE RECORDS OF THE UNITED STATES PATENT AND TRADEMARK OFFICE OF THOSE PAPERS OF THE BELOW IDENTIFIED PATENT APPLICATION THAT MET THE REQUIREMENTS TO BE GRANTED A FILING DATE.

APPLICATION NUMBER: *60/551,980*
FILING DATE: *March 10, 2004*
RELATED PCT APPLICATION NUMBER: *PCT/US05/08004*

Certified by

Jon W. Dudas

Under Secretary of Commerce
for Intellectual Property
and Director of the United States
Patent and Trademark Office

Please type a plus sign (+) inside this box → [+]

PTO/SB/16 (5-03)
Approved for use through 04/30/2003. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PROVISIONAL APPLICATION FOR PATENT COVER SHEET

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53(c).

INVENTOR(S)

Given Name (first and middle [if any])	Family Name or Surname	Residence (City and either State or Foreign Country)
Paul	Clinton	Chesterfield, MI
James R.	Drouillard	Lake Orion, MI
Craig	Stapleton	St. Clair, MI
Bradford D.	Armstrong	Barrie, Ontario

☒ *Additional inventors are being named on the____ separately numbered sheets attached hereto*

TITLE OF THE INVENTION (280 characters max)

Injection Molded Roof Rail

Direct all correspondence to: **CORRESPONDENCE ADDRESS**

☒ Customer Number **28886** →

OR *Type Customer Number here*

Place Customer Number Bar Code Label here

☒ Firm or Individual Name	Robin W. Asher				
Address	Clark Hill PLC				
Address	500 Woodward Avenue, Suite 3500				
City	Detroit	State	MI	ZIP	48226-3435
Country	US	Telephone	313-965-8300	Fax	313-965-8252

ENCLOSED APPLICATION PARTS *(check all that apply)*

☒ Specification *Number of Pages* 7

☐ Drawing(s) *Number of Sheets* 5

☐ Application Data Sheet. See 37 CFR 1.76

☐ CD(s), Number

☐ Other (specify)

METHOD OF PAYMENT OF FILING FEES FOR THIS PROVISIONAL APPLICATION FOR PATENT *(check one)*

		FILING FEE AMOUNT ($)
☐	A check or money order is enclosed to cover the filing fees	
☒	The Director is hereby authorized to charge filing fees or credit any overpayment to Deposit Account Number 50-1759	$160.00
☐	Payment by credit card. Form PTO-2038 is attached.	

The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.

☒ No.

☐ Yes, the name of the U.S. Government agency and the Government contract number are: _____

Respectfully submitted,

SIGNATURE

TYPED or PRINTED NAME **Robin W. Asher**

TELEPHONE **313-965-8300**

Date 3/9/04

REGISTRATION NO. *(if appropriate)* **41,590**

Docket Number: **19350-096950**

USE ONLY FOR FILING A PROVISIONAL APPLICATION FOR PATENT

This collection of information is required by 37 CFR 1.51. The information is used by the public to file (and by the PTO to process) a provisional application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 8 hours to complete, including gathering, preparing, and submitting the complete provisional application to the PTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Mail Stop Provisional Application, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

PROVISIONAL APPLICATION COVER SHEET
Additional Page

PTO/SB/16 (8-00)
Approved for use through 10/31/2002. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Docket Number	19350-096950	Type a plus sign (+) inside this box →	+

INVENTOR(S)/APPLICANT(S)

Given Name (first and middle [if any])	Family or Surname	Residence (City and either State or Foreign Country)
Martin R.	**McLeod**	**Barrie, Ontario**
Keijo J.	**Huotari**	**Fenton, MI**
Rudolf Allan	**Schrempf**	**Brampton, Ontario**
Jack V.	**Henderson**	**West Bloomfield, MI**
Steven	**Grgac**	**Concord, Ontario MI**

Number 2 of 2

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

CERTIFICATE OF MAILING BY EXPRESS MAIL

EXPRESS MAIL MAILING LABEL NO. EL 962723958 US

I hereby certify that this paper (along with any paper referred to as being attached or enclosed) is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 C.F.R. 1.10 on March 10, 2004, and is addressed to: Mail Stop Provisional, Commissioner for Patents, PO Box 1450, Alexandria, VA 22313-1450

By: _____
Janet H. Fournier

Attorney Docket No : 19350-096950

UNITED STATES

UNITED STATES PROVISIONAL PATENT APPLICATION

For: Injection Molded Roof Rail

Inventors/
Applicants: Paul Clinton
James R. Drouillard
Craig Stapleton
Bradford D. Armstrong
Martin R. McLeod
Keijo J. Huotari
Rudolf Allan Schrempf
Jack V. Henderson
Steven Grgac

Assignee: Decoma International Inc.

Date: 10 February 2004

Ref:: 703408PRO

INJECTION MOLDED ROOF RAIL

FIELD OF THE INVENTION

[0001] The present invention relates to a roof rail or the like for a vehicle. More specifically, the present invention relates to a trim or accessory rail, such as a roof rail or the like, for vehicles such as sports utility, minivan or other vehicles.

BACKGROUND OF THE INVENTION

[0002] Many vehicles are provided with accessory rails, such as roof rails, on their roofs for decorative and/or cargo carrying purposes. Such rails are typically metal, being assembled from a steel or aluminum extrusion, die cast or molded end caps and one or more intermediate supports which typically are bolted, clamped or welded between the end points of the extrusion or profile. The roof rail is attached to the vehicle via bolts that extend from the end caps and intermediate supports into the roof of the vehicle.

[0003] While such roof rails have served their purpose reasonably well, they do suffer from disadvantages. One disadvantage is that the aesthetic design of the rails is limited, as they are mainly extruded with a constant cross section profile. Another disadvantage is that, as they are metal, they add to the weight of the vehicle and, in particular, raise the center of gravity of the vehicle, thus potentially decreasing the stability and cornering capability of the vehicle. Other disadvantages of these metal roof rails include the fact that they are expensive to assemble and install and require protective finishes to prevent corrosion.

[0004] A prior attempt to address some of the disadvantages of metal roof rails has been made by Toyota. Specifically, the Toyota Yaris vehicle includes a roof rail that is molded from glass-reinforced polypropylene. By molding the Yaris roof rail from plastic, a weight savings is obtained, a more flexible aesthetic design can be created than that which would be available from extruded parts and assembly costs can be reduced as the rail is a single molded piece.

[0005] However, the Yaris roof rail also suffers from disadvantages as it is molded using known gas assist molding techniques. In gas assist molding, a melt is injected into the mold cavity and then an inert gas, typically nitrogen, is then pumped into the interior of the melt to displace the central core. Gas assist injection molding is a relatively expensive process, thus mitigating at least some, if not all, of the cost savings which might be obtained by molding a roof rail versus assembling one from a metal extrusion and molded end caps, etc. Further, gas assist injection molding only produces hollow objects, and thus rails or the like with open cross sections cannot be fabricated or a secondary cutting operation

is required to form an open channel. Additionally, such roof rails have experienced difficulties in attachment to the vehicle.

SUMMARY OF THE INVENTION

[0006] It is an object of the present invention to provide a novel accessory rail for a vehicle that obviates or mitigates at least one disadvantage of the prior art.

[0007] According to a first aspect of the present invention, there is provided an accessory rail for a vehicle, comprising a main body injection molded from a long, glass fibre-reinforced polypropylene material and integrally formed opposed ends on the main body. Each end is configured for attaching the rail to a vehicle.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] Preferred embodiments of the present invention will now be described, by way of example only, with reference to the attached Figures, wherein:

Figure 1 shows a perspective view of a vehicle with an accessory rail in accordance with the present invention;

Figure 2 shows an accessory rail in accordance with an embodiment of the present invention;

Figure 3 shows one end of the accessory rail of Figure 2 with a cross section taken through line A-A of Figure 2;

Figure 4 shows an exploded view of a portion of the accessory rail of Figure 2 and the connection of a mid-mount thereto;

Figure 5 shows one technique whereby an end cap can be attached to the rail of Figure 2;

Figures 6a, 6b and 6c show additional end designs for the rail of Figure 2; and

Figures 7a, 7b and 7c show additional end designs for the rail of Figure 2.

DETAILED DESCRIPTION OF THE INVENTION

[0009] Figure 1 shows a perspective view of a vehicle 20 equipped with an accessory rail, in this case a roof rail 24, in accordance with the present invention. Figure 2 shows roof rail 24 in more detail and roof rail 24 includes a main body 28 with ends 32 with separate end caps 40 mounted over ends 32, as is described in more detail below.

[0010] Main body 28 and ends 32 are injection molded as a unitary structure and are preferably formed from long, glass fibre-reinforced organic resin material, preferably a thermoplastic material and most preferably polypropylene, where the polypropylene is reinforced with about 40%, by weight, glass

fibres of an average length, prior to being loaded into the extruder, of 0.5 inches (1.25 cm). As is well known in the art, the organic resin material can include UV stabilizers and color pigments to provide desired characteristics, such as UV resistance and color matching.

[0011] It is presently preferred that accessory rail 24 be molded in a generally conventional mold for injection-compression molding using an extruder similar to that developed by Composite Products, Inc. and taught in U.S. Patents 5,165,941 and 5,185,117 to Hawley. This extruder can produce a polypropylene melt with glass fibre where the fibre lengths in the melt are generally longer than in other processes, resulting in a material with improved strength relative to polypropylene reinforced with shorter glass fibres. Presently, the configuration employed is to supply melt from the extruder to a shooting pot and then, from the shooting pot to the mold cavity or cavities.

[0012] Figure 3 shows a portion of rail 24 with end cap 40 in place and showing the generally C-shaped cross section of main body 28.

[0013] Referring again to Figure 2, each end 32 of rail 24 is configured for attachment to the vehicle. The particular form of attachment will depend upon the vehicle to which the rail is being attached. In the present example, each end 32 includes a pair of apertures to receive mounting bolts from vehicle 20 and a pair of nuts is used to fasten rail 24 to these bolts in a conventional manner.

[0014] Rail 24 also includes a mid-mount 36, best shown in Figure 4, which can be attached to main body 28 by screw fasteners as shown. Mid-mount 36 can be optional on rail 24 and need not be provided, but can be useful to prevent deformation of main body 28 due to loads applied thereto. If mid-mount 36 is to be standard, it can be integrally molded with rail 24. Optionally, mid-mount 36 can be welded or bonded to the rail 24, utilizing conventional methods of attachment, including vibration or sonic welding or EMABOND.

[0015] One of the perceived advantages of the present invention is the ability to provide reinforcement structures 44, such as webs and/or pads of additional material, to receive fasteners, accessories or other hardware to be mounted to, or through, rail 24. Such reinforcement structures can be tapped to receive bolts, self-tapping screws or other mounting hardware. As will be apparent to those of skill in the art, the prior art extruded aluminum or gas assist molded rails cannot provide such integral reinforcement structures.

[0016] Figure 5 shows one method of attaching end cap 40 to end 32. In this illustrated embodiment, a pair of "S" clips 48 are employed, with one nip of each S clamp engaging one of tabs 52 on end cap 40 and the other nip of S clamps 48 engaging channel wall 56 in end 32. Channel wall 56 is integrally formed with end 32 and, similarly, tabs 52 are integrally formed with end cap 40. If desired

additional interference ("snap") closures can be employed and/or epoxy or other adhesives can be employed, if desired.

[0017] The embodiment of rail 24 shown in Figures 1 through 5 has been designed as a replacement for a conventional accessory rail design. However, another of the advantages of the present invention is that a variety of designs, many of which would be impossible using conventional extruding rails or gas assist molded rails, can be created.

[0018] Figures 6a through 6c show some examples of different designs in accordance with the present invention. In the design of each of Figures 6a, 6b and 6c, no end cap 40 is required as the look of the end cap 40 has been integrated into the rail 24. In Figure 6a, the end 32 of rail 24 includes an integrally molded outer wall 100 on one side of the flange 104 used to mount rail 24 to vehicle 20 and an open loop 108 which can act as a tie down point, if cargo is to be strapped atop vehicle 20.

[0019] Figure 6b shows another design for rail 24, wherein end 32 has an outer wall 100 on one side of flange 104 used to mount rail 24 to vehicle 20. An open loop 112 extends between main body 28 and the inboard edge of flange 104. Again, open loop 112 can serve as a tie down point for securing cargo.

[0020] Figure 6c shows another design for rail 24 wherein end 32 encloses flange 104, except for the inner side of rail 24 which is open to permit access to the fasteners (not shown) used to secure rail 24 to vehicle 20.

[0021] Figures 7a, 7b and 7c show some additional designs for rail 24. In Figure 7a, a design similar to that of Figure 6b is shown except loop 116, which is provided as a tie down point, extends horizontally from the top of main body 28 towards the middle of vehicle 20. Figure 7b shows an end 32 for rail 24 which is similar to the designs discussed above, except a cavity 120 is provided through main body 28 adjacent end 32 and cavity 32 can serve as a tie down point or to receive an accessory such as a light housing, or even an arm of a cargo rack (not shown) or the like to be mounted to the top of vehicle 20. Figure 7c shows an end 32 for rail 24 similar to that shown in Figure 7a, except loop 124 extends from the bottom of main body 28, rather than the top.

[0022] As illustrated by the provision of structures such as loops 108, 112, 166 and 120, unlike extruded rails the main body 28 and/or ends of rail 24 need not have a constant cross section or size which will allow designers to produce rails with a variety of aesthetics and/or functional features. Further, by employing injection molding technologies, reinforcement structures such as webs and/or pads of increased material can be provided, as can through channels, loops and other features. Further, inserts such as metal mounting components, electrical wiring for accessories such as light, antennae, etc. can be molded into rail 24 by loading the necessary elements into the mold prior to injecting the

melt to form rail 24. It is also contemplated that the C-shaped cross section illustrated in the attached Figures can be varied for other cross-sectional shapes and/or to include interior tracks or other features to receive accessories, such as cross rails, which can attach these accessories or features on the inside of the cross section. Additionally, the opening of the C-shaped profile can be directed inwardly of the vehicle.

[0023] Rail 24 can be molded from colored polypropylene or can be painted after molding to obtain a desired color and/or to protect rail 24 from UV and other environmental factors.

[0024] As will now be apparent to those of skill in the art, the injection molding with long glass fibre reinforced polypropylene provides a variety of advantages over prior art accessory rails for vehicles.

[0025] The above-described embodiments of the invention are intended to be examples of the present invention and alterations and modifications may be effected thereto, by those of skill in the art, without departing from the scope of the invention which is defined solely by the claims appended hereto.

We claim:

1. An accessory rail for a vehicle, comprising:

a main body injection molded from a long, glass fibre-reinforced organic resin material; and

integrally formed opposed ends on said main body, each end configured for attaching said rail to a vehicle.

2. The accessory rail of claim 1 wherein said main body has a generally C-shaped cross section.

3. The accessory rail of claim 1 further comprising an end cap for each opposed end, each end cap engaging a respective one end to cover the means for attaching said rail to a vehicle.

4. The accessory rail of claim 1 further comprising at least one open loop structure to serve as a tie down point.

5. The accessory rail of claim 1 further including at least one structural reinforcement feature for receiving a fastener.

6. The accessory rail of claim 1 further including a electrical harness molded into a portion of said rail.

7. The accessory rail of claim 1 wherein said long glass fibre-reinforced organic resin material includes at least one of a pigment and a UV blocker.

8. The accessory rail of claim 1 wherein said organic resin material is a thermoplastic.

9. The accessory rail of claim 1 wherein said organic resin material is polypropylene.

10. The accessory rail of claim 2 wherein said C-shaped cross-section includes features on the interior of the cross section to receive accessories.

ABSTRACT

[0026] An accessory rail, such as a roof rail, for a vehicle is injection molded from long glass fibre-reinforced organic resin material, such as polypropylene. The rail includes a main body and integrally formed ends by which the rail may be attached to a vehicle. The main body is preferably generally C-shaped in cross-section and can include reinforcement structures such as webs or pads of additional material.

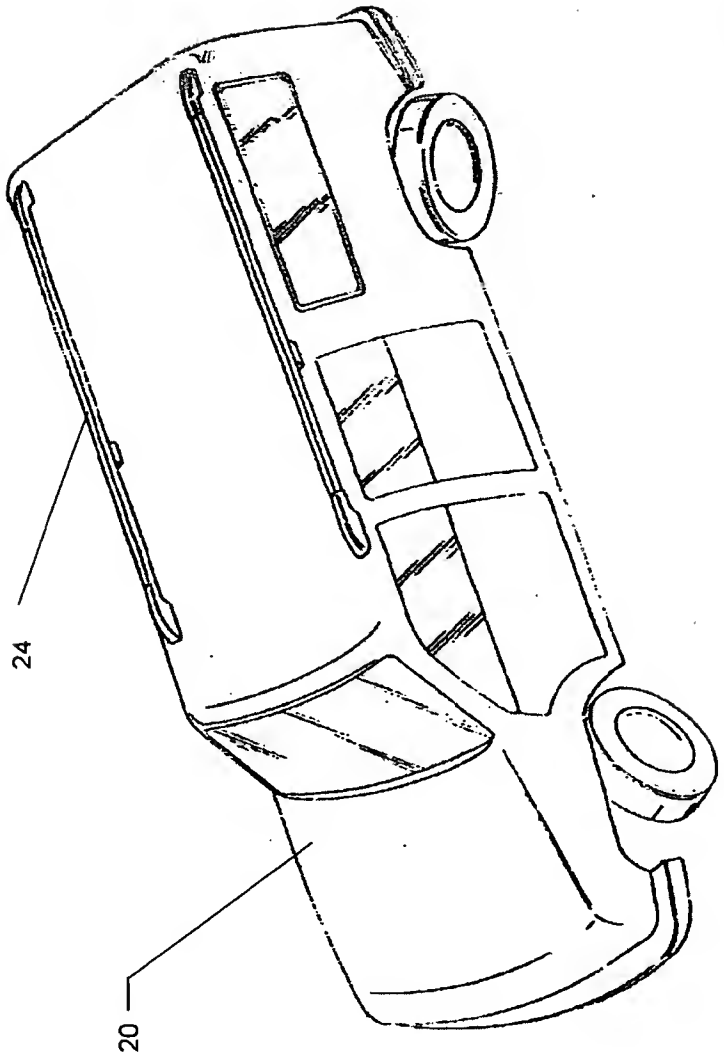

Fig.1

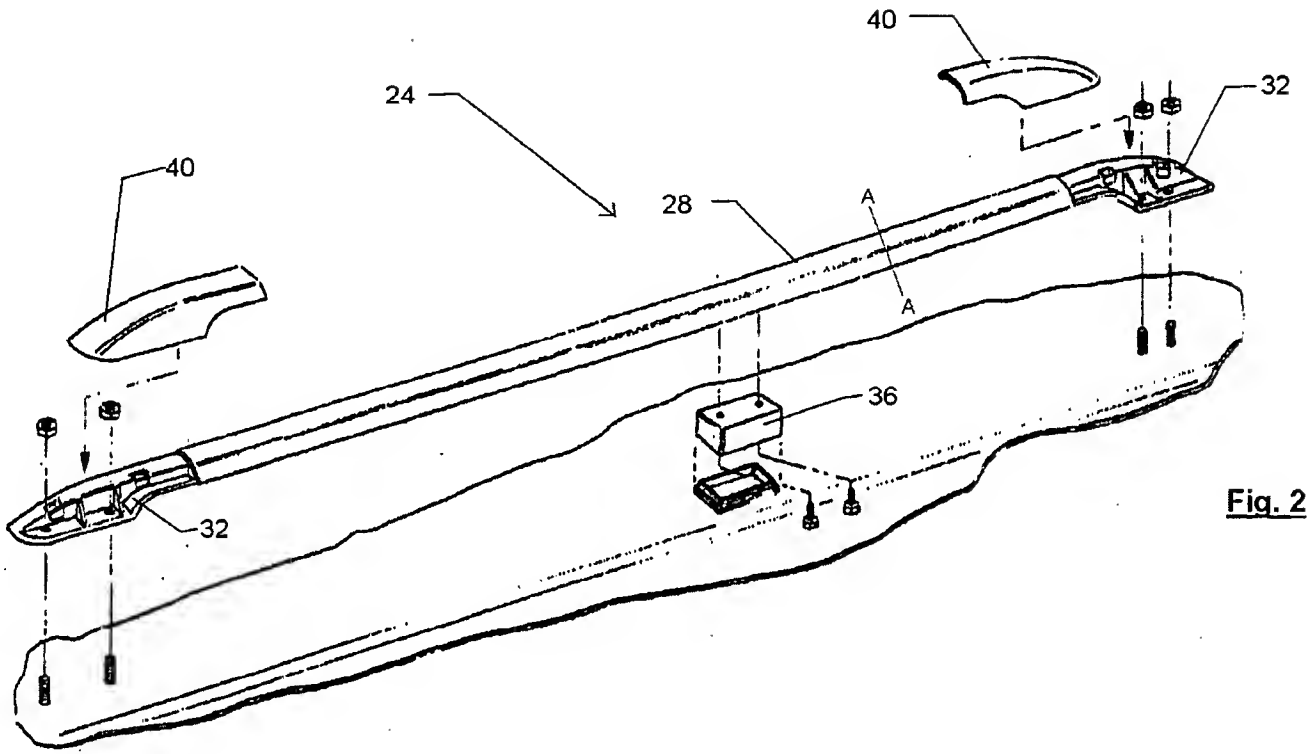

Fig. 2

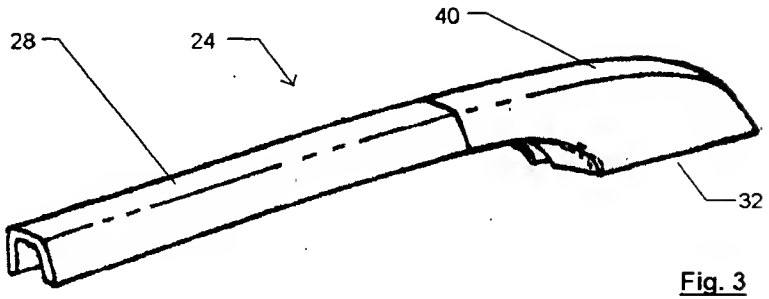

Fig. 3

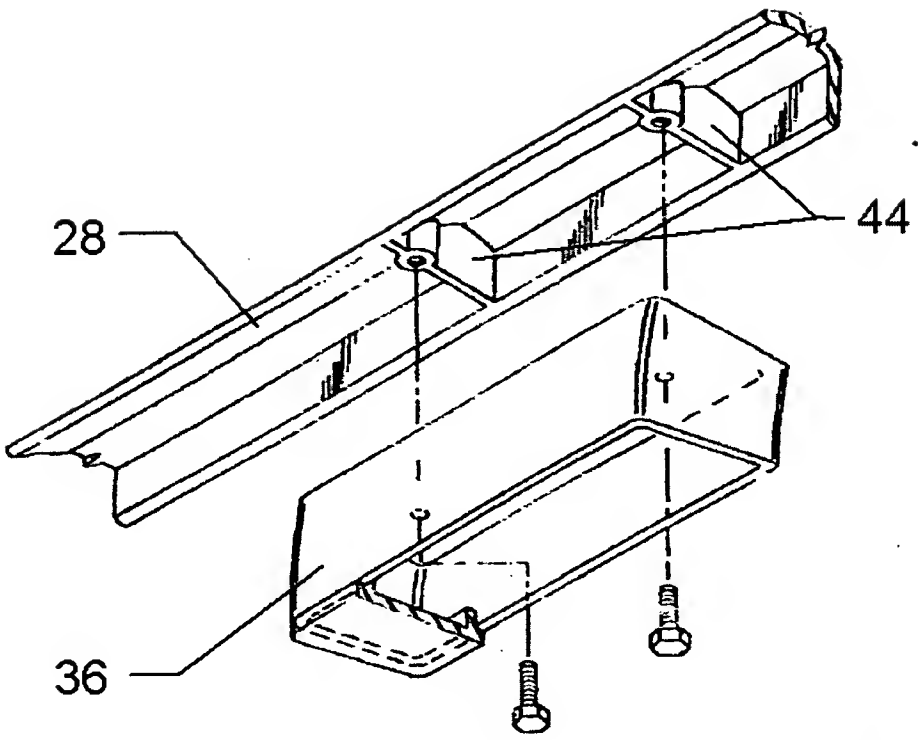

Fig. 4

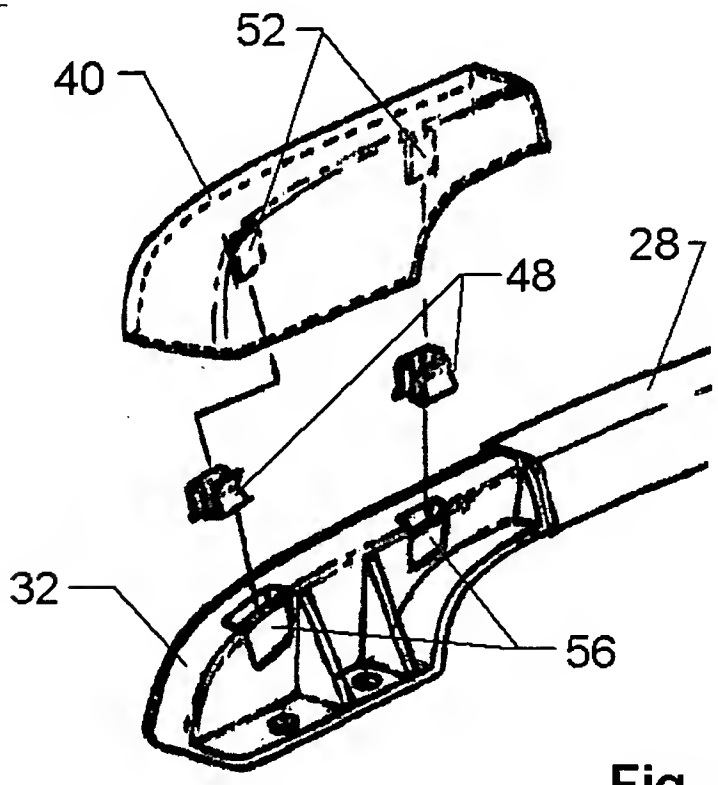

Fig. 5

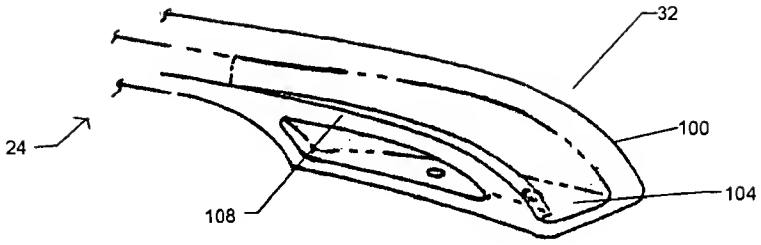

Fig. 6a

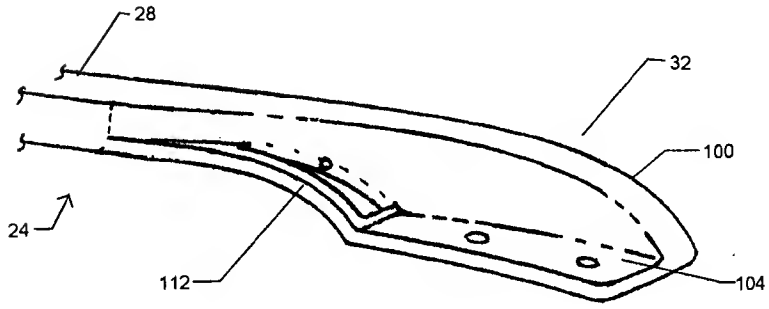

Fig. 6b

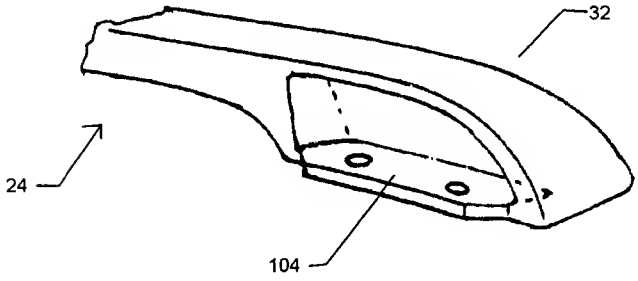

Fig. 6c

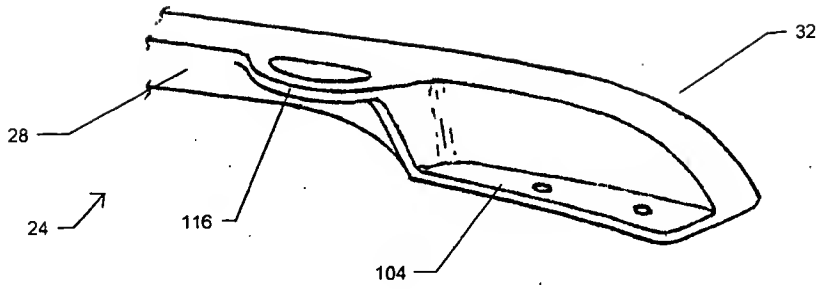

Fig. 7a

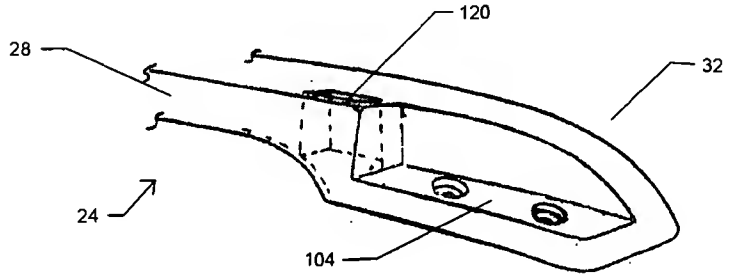

Fig. 7b

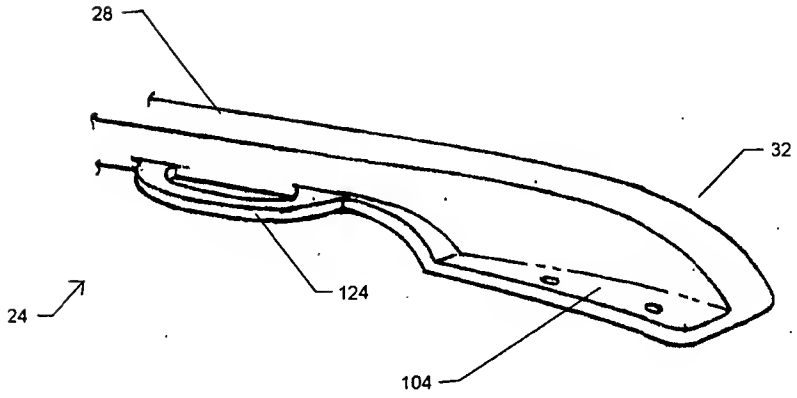

Fig. 7c